

U.S. Pat App. No. 10/816,211
Amendment A in response to
Office Action mailed 5/17/2006
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Remarks/Arguments

Applicant wishes to thank the Examiner for the careful review of the claims, specification and drawings.

Claims

Claims 1-38 and have been canceled.

New independent claims 39 and 50 have been added.

New dependent claims 40-49 and 51-59 have been added

After entry of this amendment, claims 39-59 are pending.

It is respectfully submitted that each and every feature recited in the claims are fully supported in the specification as filed. No new subject matter has been added.

Discussion of New Claims

Applicant hereby adds new independents claim 39 and 50, as followed:

39. (New) A method for determining a status of a component of a plasma processing system comprising:

identifying a set of variables, the set of variables including at least one parameter of the component, the at least one parameter of the component pertaining to the status of the component;

formulating an impedance as a function of the set of variables;

operating the plasma processing system using a plurality of signals associated with different frequencies, at least two of the plurality of signals being provided to the plasma processing system at different times;

measuring a set of voltage values and a set of current values associated with at least one of an upper electrode and a lower electrode of the plasma processing system for the plurality of signals;

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calculating a set of values of the impedance using the set of voltage values and the set of current values;

forming a set of equations using the function and the set of values of the input impedance; and

solving the set of equations to obtain a value of the at least one parameter of the component.

50. (New) A plasma processing system comprising:

a monitored component;

a signal generator configured to generate a plurality of signals associated with different frequencies, at least two of the plurality of signals being provided to the plasma processing system at different times;

an electrical measuring device configured to measure a set of voltage values and a set of current values associated with at least one of an upper electrode and a lower electrode of the plasma processing system for the plurality of signals; and

at least one computing device configured to: (a) store a mathematical relation between an impedance and a set of variables, the set of variables including at least one parameter of the monitored component, (b) calculate a set of values of the impedance using the set of voltage values and the set of current values, and (c) calculate a value of the at least one parameter of the monitored component using the mathematical relation and the set of values of the impedance.

Support of the new independent claims 39 and 49 and associated new dependent claims can be found in, for example, [0031]-[0036] and [0044]-[0059] of the specification.

The Office Action has cited Sneh (US Patent 5,863,376) and Mitrović (US Patent Publication 2005/0067386) as references.

Applicant respectfully submits that modifying Sneh's method with multiple variables and an equivalent circuit as disclosed by Mitrović does not result in the method

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of the new independent claim 39 or the plasma processing system of the new independent claim 50 of the present invention.

Specifically, Sneh discloses Synchronously Modulated Flow Draw methods and systems for providing uniform and symmetrical chemicals in chemical deposition processes that are different from the method of claim 39 for determining a status of a component and the plasma processing system of claim 50 with capability of monitoring a component.

Mitrovic discloses a method for calculating a plasma load impedance (Z_L) using an equivalent impedance (Z_{eqv}) measured using a VI probe and three lumped impedances (Z_1 , Z_2 , and Z_3) calculated based on simulations. (P. 3, Paragraphs [0026]-[0028])

Neither Sneh nor Mitrovic pertains to determining or monitoring a status of a component of a plasma processing system. Neither Sneh nor Mitrovic teaches or suggests formulating or storing a mathematical relation of an impedance and at least one parameter of the component of the plasma processing system. Further, neither Sneh nor Mitrovic teaches or suggests providing at least two of a plurality of signals at different times for obtaining a set of equations that include the at least one parameter of the component of the plasma processing system.

As such, Applicant respectfully submits that the new claims 39 and 50 are novel, nonobvious, and patentable. It is also respectfully submitted that the new claims 40-49 that depend from the new claim 39 and the new claims 51-59 that depend from the new claim 50 are also novel, nonobvious, and patentable not only due to their recitations of independently patentable features (such as, for example, incorporating electrical properties of a signal generating or measuring device in a mathematical relation of an impedance and at least one parameter of the component of the plasma processing system as in claim 47 or 48) but also due to their dependence from the patentable parent new claims 39 and 50, respectively.

For the aforementioned reasons and others, it is respectfully submitted that the pending claims are novel, non-obvious, and patentable over the cited arts of record, taken alone or in combination. No new subject matter has been added.

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Conclusion

In view of the discussion herein, Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at 408-257-5500.

If any petition is required to facilitate the entry of the present amendment, please consider this communication a petition therefore as well. The Commissioner is authorized to charge any fees beyond the amount enclosed which may be required, or to credit any overpayment, to Deposit Account No. 50-2284 (Order No. LMRX-P034/P1233).

Respectfully submitted,

/Joseph A. Nguyen/ #37,899

Joseph A. Nguyen